PB-213 472

Recommended Standards for Sanitary Landfill Design, Construction, and Evaluation and Model Sanitary Landfill Operation Agreement

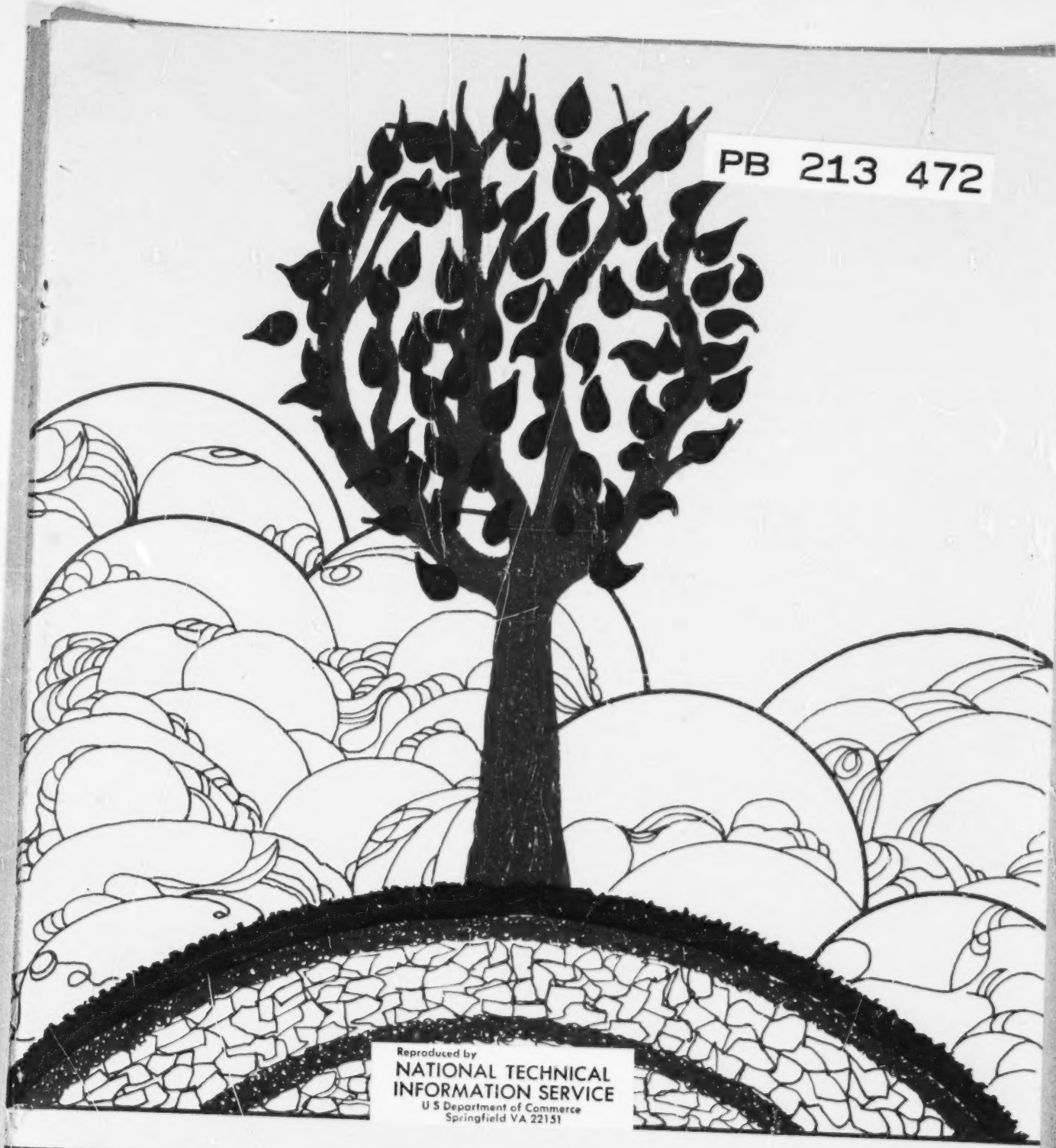
Environmental Protection Agency

1971

Distributed By:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151



PB 213 472

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

RECOMMENDED STANDARDS FOR SANITARY LANDFILL DESIGN, CONSTRUCTION, AND EVALUATION & MODEL SANITARY LANDFILL OPERATION AGREEMENT

RECOMMENDED STANDARDS FOR SANITARY LANDFILL DESIGN, CONSTRUCTION, AND EVALUATION & MODEL SANITARY LANDFILL OPERATION AGREEMENT

This publication (SW-86ts) was jointly prepared by
The National Solid Wastes Management Association and
the Federal solid waste management program

U.S. ENVIRONMENTAL PROTECTION AGENCY
1971

FOREWORD

THE SANITARY LANDFILL is an acceptable and recommended method for the ultimate disposal of solid wastes. The title of this disposal method is often mistakenly applied to the open burning dumps that disfigure the U.S. countryside, despite the fact that the sanitary landfill is an engineering project requiring sound planning and careful construction with detailed plans, specifications, and adequate agreements to assure proper construction and operation.

Both public and private organizations are deeply involved in the management of solid wastes, by necessity, since the efforts of both groups are needed to cope with the increasingly complex problems involved. Where government chooses to utilize private enterprise as an integral part of a total solid waste management system, mutually agreeable arrangements must be developed to protect both. The recommended design and construction standards and the model sanitary landfill agreement were developed by the National Solid Wastes Management Association and the Federal solid waste management program for the use of government and industry in their negotiations. The evaluation technique was developed by the Federal solid waste management program (now part of the U.S. Environmental Protection Agency). Because of the nature of any model, individuals utilizing this model should modify the content to fit their particular project. The purposes of the recommended standards and model agreement are to provide the necessary framework to assure the development of satisfactory arrangements between government and industry, and proper design and construction of a sanitary landfill.

SANITARY LANDFILL
DESIGN, CONSTRUCTION, AND EVALUATION

A sanitary landfill is an engineered method in which solid wastes are disposed of by spreading them in thin layers, compacting them to the smallest practical volume, and covering them with earth each day in a manner that minimizes environmental pollution.

While it is possible to construct a sanitary landfill on nearly all topographies, some land formations are more difficult than others to use. This makes each sanitary landfill somewhat different, and it would be impossible to delineate the techniques required at every potential site. The discussions in this document are intended to cover those features and procedures that are intrinsic to a good sanitary landfill operation.

The recommendations in this document suggest the basic requirements involved in designing and constructing a sanitary landfill. In addition, an evaluation method is provided to enable the operator, designer, or control agency to determine whether the site is achieving a good operation. The evaluation method is divided into two sections: the first discusses those requirements that must be met before a site can be called a sanitary landfill; the second covers items that upgrade the overall operation but must be judged in terms of local requirements. The evaluation procedure includes a checklist recommended for field use by those familiar with the evaluation.

The Solid Waste Management Office has developed the evaluation method for the express purpose of providing a tool that a community, organization, consultant, official, or citizen can use to judge the design and construction of any site under consideration. The use of this document no way guarantees that good design and construction can be achieved, but if the principles advanced are understood and applied, good design and construction will certainly be easier to attain.

SANITARY LANDFILL DESIGN

Site Location Requirements

The disposal site shall: (1) be easily accessible in any kind of weather to all vehicles expected to use it; (2) safeguard against water pollution originating from the disposed solid waste; (3) safeguard against uncontrolled gas movement originating from the disposed solid waste; (4) have an adequate quantity of earth cover material that is easily workable, compactible, free of large objects that would hinder compaction, and does not contain organic matter of sufficient quantity and distribution conducive to the harborage and breeding of vectors; (5) conform with land use planning of the area.

Site Design

The project plan shall include a general location map and topographic map of the area showing land use and zoning within 1/4 mile of the solid waste disposal site. The topographic map shall be of such a scale that it shows all homes, buildings, wells, watercourses, dry runs, rock outcroppings, roads, and other pertinent details.

The project plan shall also include a plot of the site that shows dimensions, location of soil or rock borings, proposed trenches or original fill face, winter cover stock piles, and fencing. Cross sections shall be included on the plot plan or on separate sheets that illustrate both the original ground and proposed fill elevations. The scale of the plot plan should not be greater than 200 feet per inch.

A report shall accompany the plans regarding; (1) population and area to be served; (2) anticipated types, quantities, and sources of solid wastes to be disposed of; (3) site geology, hydrology, and soil conditions; (4)

source and pertinent engineering properties of cover material and the projected method of protecting it for winter operations; (5) types and numbers of equipment to be used for excavating, earth moving, spreading, compacting and other purposes; (6) persons responsible for the actual operation and maintenance of the site and intended operating procedures; (7) ultimate plan for the completed site.

The design of the sanitary landfill shall include one or more topographic maps at a scale of not over 200 feet to the inch; contour intervals shall not exceed 5 feet. The maps shall show: the proposed fill area; any borrow sections; access roads; grades for proper drainage of each lift required and a typical cross section of a lift; special drainage and gas control devices if necessary; fencing; equipment shelter; existing and proposed utilities; employee facilities; and all other pertinent information to indicate clearly that the sanitary landfill will be developed, operated. and completed in an orderly manner.

The sanitary landfill should be designed by a registered professional engineer.

Operational Design Features

The disposal site shall be provided with operational features and appurtenances necessary to maintain a clean and orderly operation; (1) control of access to the site by fencing or other suitable means; (2) an all-weather access road (if excessively bad weather makes the working face inaccessible, it may be necessary to provide a landfill area near the entrance to the site; (3) suitable devices, such as portable fences, for litter control.

In addition to the required features, there are others that are highly recommended: (1) operational plans to direct and control the use of the site; (2) signs indicating traffic flow, hours of operation, and any charges for disposal; (3) scales for weighing the solid waste received (in a small operation periodic weighing on public or other scales is acceptable; (4) dust control methods (these may require the use of chemicals, oils, or water sprays); (5) communication devices for emergency use and for operational control; (6) electrical service for operations and repairs; (7) fire protection and fire-fighting facilities adequate to ensure the safety of employees and provisions for dealing with accidental burning of solid waste in the landfill; (8) first-aid equipment and training.

Personnel and Personnel Facilities

In order to man and operate the site adequately the following are recommended: (1) a trained supervisor or foreman and trained equipment operators; (2) a shelter for employees to use during inclement weather; (3) a potable water supply for landfill personnel and collection crews; (4) sanitary toilets on or near the site; (5) training in the proper and safe operation of all equipment.

Equipment

To assure safe and efficient operation the following are required: (1) sufficient equipment for spreading, compacting, and covering operations; (2) arrangements whereby alternate equipment is provided within 24 hours following an equipment breakdown.

As a further aid, the following are recommended: (1) safety devices on equipment to shield and protect operators; (2) maintenance and storage shelters.

SANITARY LANDFILL CONSTRUCTION

General

Certain operations must be carried out:

1. Access to the site must be controlled to keep unauthorized persons out and to assist the landfilling operation. (Access shall be allowed only when an attendant is on duty and only to authorized users.)

2. Burning of waste material shall be prohibited.

3. Blowing paper shall be controlled by providing a portable fence near the working area, and the entire area shall be policed at least daily.

4. Salvaging and scavenging shall not be allowed at the working face.

5. Provision shall be made to ensure that no pollution of surface or ground water is created.

6. Provisions shall be made for on-site control of potential gas movement from the landfill.

Other operations are strongly recommended:

1. Operational records should be maintained daily. They should include the type, weight, and volume of solid wastes received; type and volume of cover material used; the portion of the landfill used (determined by cross section and survey); any deviations made from the original plan of operation; and equipment maintenance and cost records. A monthly report should be prepared that describes the amounts of solid waste received, the area of the fill used, the volume of the fill used, and the amount of the cover material used. The report should be submitted to the appropriate governmental agency. Cost records should be maintained and should conform to those recommended by the Solid Waste Management Office in *An Accounting System for Sanitary Landfill Operations,* U.S. Public Health Service Publication No. 2007.

2. Upland surface drainage should be diverted around the site to control infiltration at the fill site and erosion of the in-place cover material.

3. Conditions unfavorable for the habitation and production of insects and rodents should be maintained by carrying out sanitary landfill operations promptly and systematically. It is recommended that the site be inspected regularly by an independent pest control firm and certified reports submitted to the appropriate government agency. Supplemental vector control measures should be instituted when necessary. Domestic animals should be excluded from the site, and proper control measures should be used to control wildlife, when necessary.

4. A detailed description and a plat of the completed fill site (as built) should be recorded with the proper local agency responsible for maintaining titles and records of land to provide notice to future users and owners of the site. The detailed description should include but not be limited to: type and location of pollution controls, and original and final terrain descriptions.

5. Continual training of personnel in the proper operation of a sanitary landfill should be provided.

Landfilling

Certain procedures are required during landfilling:

1. The working face shall be as small an area as the equipment can safely and efficiently operate in.

2. The solid waste shall be spread and compacted in thin layers. In the construction of each cell, it shall be spread into layers that do not exceed 2 feet prior to compaction. The number of layers incorporated into a cell depends on the design and configuration of the site.

3. All solid waste shall be covered daily with at least 6 inches of compacted soil. Daily cover has three main functions: to provide insect and rodent control, to provide fire breaks between cells, and to prevent exposure and blowing of litter and to offer an aesthetically pleasing site at the end of the working day. The in-place cover must be maintained until further filling or the addition of final cover is made.

4. Final cover shall be applied to any surface that represents the final grade of the sanitary landfill; 2 feet of compacted soil is required. Trees, shrubs, and other plants often require more than two feet of soil to grow. Suitable grasses should be planted to prevent erosion and surface deterioration. Final cover shall be placed over any completed section of

the fill within 7 days following the placement of solid waste within that portion.

Other procedures are recommended during landfilling:

1. Supervision should be available to coordinate all unloading activities.
2. Special provisions should be made for vehicles being unloaded by hand so that the flow of mechanically unloading vehicles is not impaired.
3. Final cover should be graded to drain surface run-off water. For this reason, it is best to slightly overdesign initial grades so that when settlement occurs, the surface will be sufficient for good drainage. The top surface should slope 2 to 4 percent, and the side slopes should not be so steep as to cause an erosion problem.

Special Waste Handling

Handling and disposing of waste sludges, waste liquids, and hazardous materials shall be given special consideration with regard to water pollution and the health and safety of employees. Large bulky items should be reduced in volume before daily cover is applied.

Supervision and Inspection

The following recommendations apply:

1. The supervisor of the operation should be an individual who has had experience in earthmoving, waste handling, and disposal.
2. Routine inspection and evaluation of landfill operations should be made by a representative of the appropriate regulatory agency. A notice of any deficiencies, together with any recommendations for their correction, should be provided to the owner or agent responsible for the use of the land and the appropriate individual or firm or governmental agency responsible for the landfill operation.
3. A representative of the appropriate regulatory agency should inspect the completed sanitary landfill before the earthmoving equipment is removed, and any corrective work should be performed before the landfill project is accepted as completed. Arrangements should be made for all cracked, eroded, and uneven areas in the final cover to be repaired as required during the years following completion of the fill.

SANITARY LANDFILL EVALUATION

This evaluation method is intended to measure the level of acceptability of the operations taking place at a disposal site, as well as to provide an overall comparison of its suitability to that of other evaluated sites. The evaluation consists of two subsets of evaluative criteria. The first subset comprises 10 Requirements, all of which must be satisfied if the site is to qualify as a sanitary landfill.

If the operation is a sanitary landfill, the second subset (13 Recommended Items) is provided to achieve a broader evaluation of other features of sanitary landfill design and construction. Operations vary due to size and locality, and certain items may not be required. An exceptional sanitary landfill would meet all Requirements and Items.

Each Requirement and Item in the evaluation is followed by a statement of what is needed to qualify, the reasoning for the statement, and the criteria that must be met. The sanitary landfill should be inspected in detail in order to complete the evaluation. (A suggested check list is included to aid in the evaluation.) Some criteria will require that the operator or supervisor answer certain questions, and precautions should be taken, therefore, to assure that the questions are understood and that the answers are reliable. If possible, written documentation should support the answers.

Sanitary Landfill Requirements

Requirement A: Open Burning Prohibited. No solid waste shall be burned at the sanitary landfill.

Basis: Open burning of solid waste creates odors, air pollution, and fire and safety hazards. It also adversely affects public acceptance of the operation and proper location of future sanitary landfill sites. Local laws that allow or require the open burning of such materials as diseased elm trees and condemned dry foods are outmoded. Such materials can either be incorporated within the sanitary landfill or disposed of in such a manner as to prevent health hazards or nuisances. Open burning for any reason converts the operation to that of the open dump.

Open burning of solid waste on the site is prohibited at all times. Yes__ No__

Requirement B: Access Limited. Access to a sanitary landfill shall be limited to those times when an attendant is on duty and only to those authorized to dispose of solid waste.

Basis: If public use is allowed when no attendant is on duty, scavenging, burning, and indiscriminate dumping commonly occur. Men and equipment must then be diverted to restore sanitary conditions. When access to the site during operating hours is limited to those authorized, traffic and other accident hazards are minimized.

Access by unauthorized vehicles or pedestrians is controlled. Yes__No__

Requirement C: Spreading and Compacting. Solid waste shall be spread in uniform layers not over 2 feet thick prior to compaction.

Basis: Successful operation and maximum utilization of a sanitary landfill depend on adequate compaction of the solid waste. In addition, settlement will be excessive and uneven if this is not done. Settlement permits invasion by insects and rodents and severely limits the usefulness of the finished area.

Compaction is best initiated by spreading the solid waste evenly in shallow layers, and better compaction is achieved if the working face is operated on a slope. Further compaction is provided by the repeated travel of equipment over the layers and, if necessary, by the use of special equipment.

Solid waste is properly spread and compacted. Yes__No__

Requirement D: Daily Cover. A uniform compacted layer of at least 6 inches of suitable earth cover shall be placed on all exposed solid waste by the end of each working day.

Basis: Daily covering is necessary to prevent insect and rodent infestation, blowing litter, fire hazards, an unsightly appearance, and to control gas and water movement. Fly emergence generally is prevented by 6 inches of compacted soil. Daily covering also divides the fill into "cells" that will limit any underground fires that might occur. The cover material should be easily workable and compactible, should be free of large objects, and should not contain organic matter of sufficient quantity and distribution conducive to the harborage and breeding of vectors.

A uniform, compacted layer of at least 6 inches of suitable earth cover is used for daily cover. Yes__ No__

Requirement E: Final Cover. A uniform layer of earth cover compacted to a minimum depth of 2 feet shall be placed over the entire covered surface of each portion of the final lift. This shall be done not later than one week following the placement of solid waste within that portion.

Basis: A minimum final cover of 2 feet of compacted suitable earth cover will prevent emergence of insects from the compacted solid waste, minimize the excape of odors,

prevent rodents from burrowing, provide for control of gas and water movement, support plant growth, and provide an aesthetically acceptable finished site. This cover also provides an adequate bearing surface for vehicles and is of sufficient thickness for cover integrity in the event of settlement or erosion. Workability and compaction characteristics should at least equal those provided for daily cover.

A minimum final cover of 2 feet of compacted earth cover is used as stated.
Yes__No__

Requirement F: Environmental Protection. The location and the operation must have the approval of the appropriate governmental agency, such as the State Department of Health. There shall be no contamination of ground or surface waters by deposited solid wastes or their products of decomposition, and no hazard or nuisance caused by gases or other products generated by the biologically or chemically active wastes.

Basis: Location, nature of the waste deposited, and substandard operational procedures may lead to pollution of surface waters or underground aquifers. Unless proper standards of location and operations are followed offensive and dangerous concentrations of gases may occur in the soil or above ground and adversely affect the environment. It may be necessary to provide special construction techniques or alter operations to control such conditions.

Solid waste is placed so that the environment is not and will not be adversely affected.
Yes__No__

Requirement G: Blowing Litter Controlled. Blowing litter shall be controlled by fencing placed near the working area or by the use of earth banks or natural barriers. The entire site shall be policed at least daily. Unloading shall be performed so as to minimize the scattering of the solid waste.

Basis: The purpose of the sanitary landfill is to dispose of solid waste in a nuisance-free manner. If papers and other light materials are scattered and the area is not policed, fire hazards, nuisances, and unsightliness result.

Blowing litter is controlled and the site and surrounding area routinely policed.
Yes__No__

Requirement H: Salvage Prohibited. Salvaging shall not be permitted at the working face of the sanitary landfill.*

Basis: Nothing can be tolerated that interferes with the prompt sanitary disposal of solid waste. Salvaging at the working face delays the filling operation and creates unsanitary conditions. The accumulation of salvaged materials also provides harborage for vectors and promotes an unsightliness that can be detrimental to public acceptance of the operation.

Salvaging is never allowed at the working face.
Yes__No__

Requirement I: Operational Considerations. Provision shall be made for all-weather access roads leading to the disposal site, and written provisions and guarantees shall be made for the replacement of operating equipment when it is down for more than 24 hours.

Basis: The purpose of a sanitary landfill is the immediate disposal of solid waste, because this results in the elimination of nuisances and produces an aesthetically acceptable operation. A major breakdown of operating equipment for more than 24 hours reverts the

*Any salvage or reclamation of solid waste materials must take place in a systematic and controlled manner at some site other than the operating area. If such a facility is physically located on the same land plat or nearby, it should *not* be considered part of the sanitary landfill operation.

sanitary landfill operation to an open dump. Access roads that are not negotiable by collection vehicles cause unnecessary delays in the disposal operation.

Sanitary landfills utilizing more than one piece of equipment are normally able to operate efficiently even if one piece of equipment has a major breakdown because it may have sufficient reserve capacity. Smaller operations that involve only one piece of equipment require some type of prior written agreement that guarantees the equivalent of standby equipment within 24 hours after any major breakdown.

Heavy duty use of equipment requires that a schedule of inspection and maintenance be followed to keep it operational under normal conditions (See Recommended Item 5).

Provisions have been made to assure all-weather access roads and to guarantee the equivalent of standby equipment within 24 hours following major breakdown to normal operating equipment. Yes__ No__

Requirement J: Special Waste Handling. Toxic, pathogenic, corrosive, flammable, explosive, and other hazardous wastes shall be handled only if special provisions are made.

Basis: Materials such as oil sludges, chemical wastes, magnesium shavings, empty pesticide containers, and contaminated medical wastes can be a special hazard to employees and to the environment if their presence is not known or if they are improperly handled. The site must also have special evaluations to determine that there will be no adverse effects on the environment.

Suitable procedures are established and followed for disposal of special wastes or the wastes are excluded. Yes__ No__

Sanitary Landfill Recommended Items

ITEM 1: Instructions for Users. Signs should be posted that clearly indicate the purpose of the operation, the owner or operator of the site, hours of operation, instructions for after-hours delivery, materials accepted or excluded, fees charges, and emergency telephone numbers.

Basis: The site is typically intended to include use by the general public, and guidance must, therefore, be given regarding the location and purpose of the activity and its relationship to the user. Proper use of the site is not guaranteed, but instruction is an essential step in gaining compliance.

A sanitary landfill may sometimes be called a "land reclamation project" or something similar but *never* a "dump," because this term connotes an unacceptable operation. Provision of some method of storage, such as a bulk container near the gate, is an added service for the small hauler or householder who arrives after hours. Persons arriving at the site should quickly be able to determine if their material will be accepted and if so, the cost per unit (ton, cubic yard, etc.). If there should be an emergency such as a fire, either during or after working hours, or a person is injured, clearly posted numbers will expedite obtaining assistance.

Suitable informational and directional signing is provided at the entrance and/or other appropriate locations. Yes__ No__

ITEM 2: Measuring Facilities. Provision should be made for weighing or adequately measuring all the solid waste delivered.

Basis: A suitable method of measuring incoming or deposited solid waste is desirable to provide a reliable quantity of data to determine trends and to estimate needs. Estimates of volumes based on truckloads rather than weights are misleading. Weighing is the best basis for establishing fees, and scales should be required as an integral part of the operation. Determination of the volume increments in deposited solid waste may be done

by making periodic volumetric surveys; this permits the use-rate and remaining capacity of the site to be evaluated.

Suitable fixed or portable scales have been installed and are used continuously, or the sanitary landfill is routinely "cross-sectioned" at least every 30 days to determine volumes in place. Yes__No__

ITEM 3: Communications. Telephone or radio communications should be provided.

Basis: Communications are desirable at the generally remote sanitary landfill sites, in case of emergency. If the sanitary landfill is part of a combined collection and disposal system, good communications will result in better performance throughout the system.

Reliable communications are installed at the site. Yes__No__

ITEM 4: Employee Facilities. Suitable shelter and sanitary facilities should be provided for personnel.

Basis: Shelter should be available to employees during inclement weather, and toilet and handwashing facilities are desirable.

Permanent or temporary shelter of adequate size is provided along with safe drinking water, sanitary handwashing and toilet facilities, suitable heating facilities, screens, and electricity (if needed). Yes__No__

ITEM 5: Equipment Maintenance. Provision should be made for routine maintenance of equipment and for prompt repair or replacement.

Basis: Equipment breakdowns of a day or more result in the accumulation of uncovered solid waste (as at an open dump) with all the attendant health hazards and nuisances. Systematic, routine maintenance of equipment reduces repair costs, increases life expectancy, and helps to prevent breakdowns. In the event of a breakdown, prompt repair of equipment will materially shorten down time.

Facilities for routine maintenance are available, and provisions for major maintenance and repair have been made. Yes__No__

ITEM 6: Unloading Area and Working Face. The unloading of the solid waste should be controlled and restricted to an area where the material can easily be incorporated into the working face with the equipment available.

Basis: Proper operation requires systematic placement of the solid waste in a restricted unloading area. Unloading must be coordinated with spreading and compacting. Controlled unloading reduces work, conserves landfill volume, permits better compaction, minimizes scattering of solid waste, and expedites unloading.

The type and size of the unloading area depends on the amount of solid waste received, the type of operation, and the size of the working face. A large working face increases the area to be compacted and covered, with resulting high cost, delays, and unnecessarily exposed solid waste.

Unloading is controlled at all times by signs or a supervisor, and the size of the unloading area is balanced with the size of the working face to allow collection vehicles to unload promptly. Yes__No__

ITEM 7: Fire Protection. Suitable measures should be taken to prevent fires and to control them if they start.

Basis: Fires endanger life and property. Smoke and odors are nuisances to nearby property owners, endanger disposal personnel, and interfere with sanitary landfilling operations. Deliberate burning makes sanitary landfills almost the equivalent of open dumps.

An adequate supply of hoses and of water under suitable pressure is available or a stockpile of earth is maintained reasonably close to the working face of the fill to smother fires; suitable fire extinguishers are on all equipment and in all buildings. Yes __No__

ITEM 8: Bulky Waste Handling. Large or bulky items, sewage solids or liquids (septic tank or cesspool pumpings, sewage sludge, and grit), and other materials that are hard to manage should be disposed of only if special provisions are made.

Basis: Sewage solids or liquids are hard to handle, potentially infectious, and capable of creating health hazards or nuisances if not properly handled. When the sanitary landfill design includes special provisions for the disposal of such large or bulky items as car bodies, refrigerators, water heaters, demolition wastes, tree stumps, logs and branches, they need not be excluded.

Suitable procedures are established and followed for disposal of hard-to-handle materials. Yes__No__

ITEM 9: Vector Control. Conditions unfavorable for the production of insects and rodents should be maintained by carrying out routine operations promptly in a systematic manner. Supplemental vector control measures can be instituted if necessary.

Basis: Proper operation denies insects and rodents food and harborage. Incoming solid waste loads and a rural setting are, however, natural environments for vectors. If any appear, a supplemental vector control program will quickly eliminate them.

Vector control is adequately provided. Yes__No__

ITEM 10: Dust Control. Suitable control measures should be taken wherever dust is a problem.

Basis: Excessive dust at the sanitary landfill can slow down operations, cause accidents, harm equipment, create aesthetic problems, and lead to injuries.

Dust control measures are applied as needed. Yes__No__

ITEM 11: Accident Prevention and Safety. Employees should be instructed in the principles of first aid and safety and in the specific operational procedures necessary to prevent accidents. An adequate stock of first-aid supplies should be on hand.

Basis: The use of heavy earth-moving equipment, the maneuvering of collection trucks and other vehicles, and the infectious, explosive, or flammable items that may be in solid waste can create accident hazards. Since some sites are in remote locations, it is particularly important that personnel be oriented to accident hazards, trained in first aid, and provided first-aid supplies. For reasons of safety, only those authorized to use the site should have access to it.

Employees are given periodic safety training, an adequate first-aid kit and at least one employee trained in first-aid are available at the site at all times. Yes__No__

ITEM 12: Drainage and Grading. The entire site should be graded or provided with drainage facilities to minimize runoff onto the sanitary landfill, to prevent the erosion of earth cover, and to drain rain water from the surface of the sanitary landfill. The final surface of the sanitary landfill should be graded to a slope of at least one percent, but no surface slope should be so steep as to cause erosion of the cover. The surface drainage should be consistent with the surrounding area and should in no way adversely affect proper drainage from adjacent land.

Basis: Runoff from lands adjacent to the site, unless diverted, and rain falling on the surface

of the site may percolate into the sanitary landfill and contaminate either ground or surface waters. Cover material may also be removed by erosion, and standing water may permit mosquitos to breed or interfere with access, unloading, compacting, or placement of cover. To have the sanitary landfill recognized as an acceptable solid waste disposal method, it is important that the complete sanitary landfill blend with its surroundings and not impair adjacent land usage.

The sanitary landfill is properly graded and drained. Yes__No__

ITEM 13: Plan Development and Execution. A sanitary landfill should be planned and designed by a qualified individual. Planned use of the site following construction should be an integral part of the planning, design, and construction. A daily log should be maintained by the supervisor to record such operational information as type and quantity of solid waste received, type and volume of cover material used, the portion of the site used, and deviations made from the plans and specifications. A copy of the original plans and specifications, a copy of the daily log, and a plan of the completed sanitary landfill should be filed with the local governmental agency responsible for maintaining titles to land.

Basis: Completed sanitary landfill sites are ultimately utilized for a variety of purposes. When the ultimate use of the site is known beforehand, the operation can be planned so that suitable building sites, roads, and utilities can be provided. Final grades can be established and allowances made for landscaping and drainage. A record of the construction of the sanitary landfill is necessary for the most efficient utilization of the completed site and for the prevention of health hazards or nuisances.

Plans, record keeping, and reporting are achieved as delineated above. Yes__No__

Sanitary Landfill Evaluation Checklist

Requirements	No	Yes
A. Open Burning Prohibited	_____	_____
B. Access Limited	_____	_____
C. Spreading and Compacting Accomplished	_____	_____
D. Daily Cover Applied	_____	_____
E. Final Cover Applied	_____	_____
F. Environmental Protection Provided	_____	_____
G. Litter Control Provided	_____	_____
H. Salvage Prohibited	_____	_____
I. Operational Considerations	_____	_____
J. Special Waste Handling	_____	_____

Recommended Items

1. Operation Instructions for Users Provided	_____	_____
2. Measurement Provided	_____	_____
3. Communications Available	_____	_____
4. Employee Facilities Provided	_____	_____
5. Equipment Maintenance Facilities Provided	_____	_____
6. Unloading Area and Working Face Controlled	_____	_____
7. Fire Protection Provided	_____	_____
8. Bulky Waste Handling Provided	_____	_____
9. Vector Control Provided	_____	_____
10. Dust Control Provided	_____	_____
11. Accident Prevention and Safety Practiced	_____	_____
12. Drainage and Grading Provided	_____	_____
13. Planning, Development, and Plan Execution Provided	_____	_____

Remarks:

_____

_____

_____

_____

INSTRUCTIONS TO BIDDERS

Suggested Provisions to be Included in Instructions to Prospective Bidders

1. *Intent and Purpose.* It is the intent and purpose of this contract on which bids are sought to assure the healthful and aesthetic operation of a sanitary landfill, at one or more sites, where solid wastes originating within the City, or for which the City has accepted responsibility, will be disposed of.

2. *Qualifications of Bidders.* All bidders hereunder must furnish satisfactory evidence to the City that they have operated or are presently operating a sanitary landfill of the type and capacity involved here. (A description of the solid wastes, including expected daily quantities and a detailed plan of the sanitary landfill site must be included for all the bidders.) The bidders must also show that they have successfully operated a sanitary landfill in a manner required by the attached ordinances for a long enough period of time that they will be able to operate under varied weather conditions prevailing in this area. (The City must develop ordinances or standards similar to those included in this publication to define the site and operational requirements to assure performance and protection of the environment.) They must list all sanitary landfill sites they have completed or are now operating; all operating sites may be inspected by city personnel to determine the bidder's eligibility.

Bidders without the experience outlined above but with sufficient experience in a comparable field, such as excavating or grading, should show an association with (a) consultant(s) and/or operator(s) qualified to assist in engineering, planning, supervising, and operating the project in accordance with the attached recommendations or ordinances. The name(s) and experience of the consultant(s) and/or operator(s) shall be contained in an attachment to the bid.

All bidders shall include as an attachment to the bid a listing with qualifications of personnel who have agreed to serve as employees, etc. of the bidder in the operation of this contract.

All bidders shall supply detailed inventories of their equipment, showing each type by model, year of manufacture, anticipated remaining useful life, and all accessories for each piece so listed. All leased equipment shall be separately listed and show the time remaining on each leased machine and any options of renewal. All new equipment to be acquired in fulfillment of this contract must be available on the effective date when operations start. Delivery guarantees by manufacturers shall be attached to the bid document.

All bidders shall be required to demonstrate to the satisfaction of the City that they have adequate financial resources, experienced personnel, and expertise to perform the services required by the specifications.

All bidders shall be held to comply with all pertinent legislation, including the Solid Waste Disposal Act of the State of_____ _____, the rules and regulations promulgated thereunder, the applicable/ attached ordinances, rules and regulations of the City, and the ordinances, rules and regulations of the County(ies) of _____. The bidder selected shall meet all the requirements of the above, including any changes, copies of which will be supplied to him by the City.

3. *Compensation.* Payment will be by ton, cubic yard, or load, of solid waste collected by the city or (its designated agents) delivered and received for disposal as set forth in a schedule attached to the agreement. While

Preceding page blank

exact quantities of solid waste per contract year cannot be specified, a minimum contract year compensation will be paid in the sum of $_____ based on an estimated weight (volume), (number), of_____tons (cubic yards) (loads). Adjustments in fees due to changing costs of doing business must be provided for in the contract document.

4. *Inspection of Site.* All bidders shall visit the site of the proposed landfill and familiarize themselves with the project, including all requirements of the plan. Submission of a bid shall be deemed conclusive by the City that a site visit has been made, and it shall constitute a waiver of all claims of error in bid, withdrawal of bid, or payment of extras, or any combination thereof under the executed contract or any revision thereof.

5. *Bonds.*

a. Performance Bond. A performance bond shall be required of the successful bidder. It shall be executed yearly by a surety company licensed to do business in this State and be in an amount equal to 50 percent of the sum shown in paragraph 3 for the first year or in the case of renewal, 50 percent of the total compensation paid in the past year for each succeeding year. Said bond shall be obtained within ten (10) days of the execution of the initial contract and each renewal thereof.

b. Payment Bond. A payment bond will be required of the successful bidder. It shall be executed by a surety company licensed to do business in this State and be in an amount to be determined by the City. It shall be conditioned to guarantee the payment of all wages and costs of materials, supplies, and insurance premiums incurred by the contractor in fulfilling the terms of the contract and will need to be delivered to the City within ten (10) days of the signing of the agreement. Insurance premiums include, but are not limited to, workmen's compensation, liability insurance, and bonds. It is estimated that the payment bond will not exceed the sum expended for wages, materials, supplies, and insurance premiums in one quarter of operation.

c. Bid Bond. Every bidder shall furnish a bid bond executed by a surety company licensed to do business in this State. He binds himself to indemnify the City against any loss, not to exceed the sum of the bond, it incurs should he fail to execute the signed agreement. Said bid bond shall equal 10 percent of the sum shown in paragraph 3.

A certified check, payable to the City, or other personal property acceptable to the City, may be deposited in lieu of a bid bond. Following determination of the bids, the three low bidders' security will be held until the execution of the agreement, at which time said security shall be returned to the respective owners.

6. *Indemnity Clause.* An indemnity clause, or alternatively, liability insurance, will be required of the successful bidder, in which he will be required to hold harmless and indemnify the City from all claims, legal or equitable (including court costs and reasonable attorney's fees), arising out of his operations.

7. *Insurance.* Motor vehicle minimums for property damage and personal injury may be set by the City. Proof of all required insurance and policy limits must be shown by certificates of required insurance provided to the City by the respective bidders, and each policy shall have a minimum cancellation period of not less than 30 days to become effective after delivery, in writing, to the City at the address shown in the agreement. While no minimum policy period will be required by the City, it is expected that the contractor will utilize long-term policies in order to obtain lower premiums.

8. *List of Officers and Stockholders.* Bidders shall submit a list of all officers and stockholders who own over 10 percent of their respective companies.

9. *Contractor's Operational Plan.* The contractor shall submit as an attachment to his bid a detailed plan of operation that conforms with the attached ordinances and

specifications. It shall also give details regarding alternate procedures that will be followed in case of equipment failure brought on by severe weather.

MODEL SANITARY LANDFILL OPERATION AGREEMENT

This agreement made and entered into this _____ day of 19___, by and between _____ _____(a City, Village, County, etc.) organized under the laws of the State of_____ _____, hereinafter referred to as the City (Village, etc) and_____ (a Corporation or a Partnership, Proprietorship, etc.) organized under the laws of the State of_____ _____ and having its principal place of business at_____, hereinafter referred to as the Contractor.

WITNESSETH:

Whereas, the Contractor is qualified to operate a sanitary landfill for the disposal of solid waste in accordance with the attached ordinances, specifications, and Instructions to Bidders; and

Whereas, the City desires the Contractor to operate the site(s) designated to be used for a sanitary landfill operation;

Now Therefore, in consideration of the mutual covenants and agreements contained herein, and of the consideration to be paid by the City to the Contractor, as hereinafter set forth, the City and the Contractor hereby agree as follows:

1. *Disposal Site.* All solid wastes shall be disposed of at the location(s) specified herein, same being the property under the control of the City (or Contractor), and more specifically described as follows:

(Insert Legal Description)

2. *Materials to be Disposed of.* The Contractor shall accept, upon payment of fees as scheduled, all solid waste created within the jurisdiction of the City or for which the City has accepted responsibility. Toxic, volatile, and other hazardous materials must be clearly identified to allow for special handling during the disposal operation. (Note: A definition of the solid wastes to be disposed of under the provisions of the contract should be included here. In addition, clarification of who shall be allowed to deliver solid waste to the site must be provided.)

3. *Operation of Site(s).* The Contractor shall have the exclusive right and responsibility to operate the disposal site(s) in accordance with the provisions of this Agreement and the attached ordinances and specifications for the term of this Agreement and any extension thereof.

4. *Compliance with Laws.* The Contractor shall operate the disposal site(s) in compliance with all applicable laws, ordinances, specifications and regulations, including the applicable solid waste disposal act of the State of_____, the rules and regulations of the State Board of Health and the City and/or County Board of Health, and the ordinances of the City and/or County; copies of each are attached hereto and are hereby made a part of this Agreement. Copies of all such laws, ordinances and regulations shall be furnished to the Contractor by the City and shall include new legislation as well as amendments.

Preceding page blank

(In the event that there are no statutes or ordinances regulating the disposal of wastes, then the City may utilize the concepts contained in the first section of this publication to develop its own ordinances and standards.)

5. *Labor and Equipment.* The Contractor shall furnish all labor, tools, and equipment necessary to operate the site(s) and shall be responsible for all required maintenance thereof. Supervision by an experienced and qualified person shall be provided at all times when the sanitary landfill is open for use or operation.

6. *Service Facilities.* The Contractor shall construct and maintain at his expense any facilities, improvements, and buildings within the site necessary for the operation of the site.

(To be included if the site is City property: The use of such land within the site shall be made available to the Contractor free of charge for the period of this Agreement or any extension thereof. At the expiration of this Agreement all permanent structures and improvements thereon shall become the property of the City or shall be removed by the Contractor, at the option of the City. [If permanent structures and improvements become the property of the City, there should be some provision for compensation to the Contractor, such as book value or fair market value. If the Contractor is required to remove such structures and improvements, he should be paid for doing so.])

7. *Offsite Improvements.* The City agrees to provide, at its expense, all required offsite improvements including any required to be made to public streets or roads, drainage facilities, etc.; it shall also provide to the site all required utilities, including adequate power and water supplies. (If any of this work is to be performed by the Contractor, it should be included in a separate contract with detailed engineering plans.)

8. *Charges for Utilities.* The Contractor agrees to pay normal and standard charges for all water, electrical power, natural gas, and phone service utilized at the site. (If any of these services are to be provided free of charge by the City, this section should be modified accordingly.)

9. *Salvage.* Neither scavenging nor salvage operations shall be permitted at the operating face of the sanitary landfill. Salvage operations, if any, shall be conducted at a location separate from the operating face of the landfill by persons licensed by the City so as not to interfere with the Contractor's operation.

10. *Title to Waste.* Title to waste shall vest, as it is deposited, in the owner of the fee simple estate.

11. *Completion of the Site.* Upon completion of disposal operations, the site shall be contoured and finished in accordance with the Approved Final Plan, which is attached hereto and is hereby made a part of this Agreement. Any changes of the Approved Final Plan must be agreed to by both the City and the Contractor. The liability of the Contractor under this Agreement shall cease upon acceptance of the site by the City.

12. *Compensation.* Compensation shall be paid pursuant to the attached schedule. (A schedule should be attached and provide for payment by weight, volume, or load. A minimum charge should be set out. Hazardous materials should be handled on a mandatory basis with fees paid by type and quantity. Experience should soon establish fees for such materials.)

(If materials are to be accepted from users other than those paid for and designated by the City, a similar schedule of prices which the Contractor can charge these users should be established. There should be clear provisions regarding the distribution of such fees to the Contractor and/or the City.)

13. *Changes in Regulations.* In the event that compliance with subsequent statutes, ordinances and/or rules and regulations changes operating costs, the parties hereto agree to renegotiate this Agreement so that the compensation shown herein shall reflect such changes.

14. *Change in Sanitary Landfill Site.* In the event that the parties hereto mutually agree to transfer said sanitary landfill operations to another site or additional sites, this Agreement shall be renegotiated to reflect any changes required; they shall include but not be limited to increased compensation due to higher operating costs.

15. *Change in Cost of Doing Business.* The fees and/or compensation payable to the Contractor for the second and subsequent years of the term hereof shall be adjusted to reflect changes in the cost of doing business, as measured by fluctuations in the Consumer Price Index (CPI) published by the U.S. Department of Labor, Bureau of Labor Statistics, for the_____ _____area. At the start of the second year and every six (6) months thereafter, the fees and/or compensation to the Contractor shall be altered in a percentage amount equal to the net percentage change in the said CPI as follows:

Compensation made for the first six months of the second year shall reflect the change, if any, that has occurred in the said CPI during the first year of this Agreement.

Beginning with the seventh month of the second year of this Agreement and every six months thereafter, the net change in compensation shall be the change in the CPI over the preceding six-month period.

16. *Term.* The initial term of this Agreement shall be for the_____-year period beginning _____, 19___, and ending_____, 19___. The initial_____-year term of this Agreement shall be extended for successive additional_____-year terms, unless one party notifies the other that it intends to terminate this Agreement. This intent must be conveyed in writing not less than ninety (90) days prior to the expiration of the initial_____-year term or of any_____-year extension thereof.

17. *Performance Bond.* The Contractor shall furnish a Performance Bond for the faithful performance of this Agreement. Said bond shall be executed by a surety company licensed to do business in this State and to be in a penal sum equal to 50 percent of the minimum compensation to be paid to the Contractor by the City for the first year of this Agreement. For each year thereafter it shall be in the penal sum of 50 percent of the total compensation paid by the City to the Contractor for the last preceding year. Said Performance Bond shall be furnished annually by the Contractor within ten (10) days of the execution of this Agreement or any extension thereof. It shall indemnify the City against any loss resulting from any failure of performance by the Contractor, not exceeding, however, the penal sum of the bond.

18. *Payment Bond.* The Contractor shall within ten (10) days of the execution of this agreement, deliver or cause to be delivered to the City a bond in the amount of $_____ executed by a surety company licensed to do business in this State. It shall guarantee payment of wages to all employees of the Contractor at the site or sites and the cost of all supplies, materials, and insurance premiums required to fulfill this Agreement.

19. *Indemnity.* The Contractor hereby binds himself to indemnify and hold harmless the City from all claims, demands and/or actions, legal and/or equitable, arising from the Contractor's operation of all disposal sites herein above described.

(Liability insurance policies approved by the City as to type and coverage may be required as a part of the indemnity provisions of this Agreement. If such policies as automobile liability, general liability, or owner's protective liability are required, the type and amount of coverage should be clearly spelled out in this section. Minimum motor vehicle liability limits set by State financial responsibility laws are seldom adequate.)

Proof of all insurance shall be furnished by the Contractor to the City by certificates of insurance. They shall have a minimum cancellation time of thirty (30) days, said time to commence after delivery of said notice to the City at the address shown above.

20. *Workmen's Compensation.* The Contractor shall carry in a company authorized to transact business in the State of _____, a policy of insurance fulfilling all requirements of the Workmen's Compensation Act of said State, including all legal requirements for occupational diseases. (Would not apply in monopoly States.)

21. *Standard of Performance.* The City may move to act if the Contractor fails to dispose of the solid waste herein provided for a period in excess of five (5) consecutive working days or fails to operate the site in accordance with the attached ordinances and specifications for a similar period. (He shall not be held liable if such failure is due to war, insurrection, riot, Act of God, or any other cause or causes beyond his control.) The City may, at its option, after sending written notice to the Contractor as provided hereinafter take over and operate any or all of the equipment he uses in carrying out this Agreement, and it may provide for such operation until such matter is resolved and the Contractor is again able to operate. Any and all operating expenses incurred by the City in so doing may be deducted by it from compensation paid to the Contractor hereunder.

During such period, the liability of the City to the Contractor for loss or damage to such equipment so used shall be that of a bailee for hire; ordinary wear and tear is specifically exempt from such liability. The liability of the Contractor to third persons shall cease and all claims or demands arising out of the operation and/or control of the site or sites shall be directed solely to the City.

Provided however; if the Contractor is unable for any cause to resume performance at the end of thirty (30) working days, all liability of the City under this contract shall cease and the City shall be free to negotiate with other contractors regarding the operation of said site or sites. If Agreement with another contractor is reached, this shall not release the Contractor herein of his liability to the City for breach of this Agreement.

22. *Arbitration.*. Any controversy or claim arising out of or related to this Agreement, or breach thereof, shall be settled by arbitration in accordance with the Rules of The American Arbitration Association, and the judgment rendered may be entered in any court having jurisdiction thereof. Such controversy or claim shall be submitted to one arbitrator selected from the National Panel of The American Arbitration Association.

23. *Landfill Inspection.* To ensure that the detailed ordinances, specifications, regulations, and laws for the operation of a sanitary landfill are complied with, a representative of the City shall inspect the landfill site and operation at least once a month during the term of this Agreement. The City may make inspections of the sanitary landfill site accompanied by designated personnel during business hours.

24. *Contractor's Personnel.*

a. The Contractor shall assign a qualified person or persons to be in charge of his operations in the City and shall inform it of said person or persons' identity with a description of his experience, etc.

b. The Contractor's employees may be required to wear clean uniforms that bear the company's name.

c. The City has the right to request the dismissal of any employee of the Contractor who violates any provision hereof, or who is wanton, negligent, or discourteous in the performance of his duties.

d. The Contractor should provide suitable operating and safety training for all his personnel. The site should be staffed at all times with at least one employee who is trained in first aid and has a first aid kit.

e. Wages of all employees of the Contractor shall equal or exceed the minimum scales

prevailing for similar work in the locality of the project. The wages for each classification of employee shall be provided to the City as an attachment to the bid document.

f. No person shall be denied employment by the Contractor by reason of race, creed, or religion.

g. Employees of the Contractor shall have the right to organize and affiliate with recognized labor unions and shall have the right to collective bargaining.

25. *Assignment.* No assignment of this Agreement or any right occurring under it shall be made in whole or part by the Contractor without the express written consent of the City; in the event of any assignment, the assignee shall assume the liability of the Contractor.

26. *Books and Records.* The Contractor shall keep daily records of wastes received, and the City shall have the right to inspect the same insofar as they pertain to the operation of the sanitary landfill site(s). The records shall show: the type, weight, and volume of solid waste received; the portion of the landfill used, as determined by cross section and survey; any deviations made from the plan of operation; equipment maintenance; and cost records. The Contractor shall submit a proposed record and accounting system for approval. All information so obtained shall be confidential and shall not be released by the City unless expressly authorized in writing by the Contractor.(A recommended set of cost accounting records is in "An Accounting System for Solid Waste Collection" developed by the Federal solid waste management program.)

27. *Bankruptcy.* This Contract shall terminate in the case of bankruptcy, voluntary or involuntary, or insolvency of the Contractor. In the case of bankruptcy, such termination shall take effect on the day and at the time the bankruptcy is filed.

28. *Number of Copies.* This Agreement may be executed in any number of counterparts, all of which shall have the full force and effect of an original for all purposes.

29. *Law to Govern.* This Agreement shall be governed by the laws of the State of _____, both as to interpretation and performance.

30. *Modification.* This Agreement constitutes the entire Agreement and understanding between the parties hereto, and it shall not be considered modified, altered, changed, or amended in any respect unless in writing and signed by the parties hereto.

31. *Right to Require Performance.* The failure of the City at any time to require performance by the Contractor of any provisions hereof shall in no way affect the right of the City thereafter to enforce same. Nor shall waiver by the City of any breach of any provisions hereof be taken or held to be a waiver of any succeeding breach of such provisions or as a waiver of any provision itself.

32. *Point of Contact.* All dealings, contacts, etc. between the Contractor and the City shall be directed by the Contractor to

(Some duly designated official of the City must be identified to serve as the contact point for the Contractor. A similar clause could designate a contact point with the Contractor.)

33. *Illegal Provisions.* If any provision of this Agreement shall be declared illegal, void, or unenforceable, the other provisions shall not be affected and shall remain in full force and effect.

34. *Notice.* A letter addressed and sent by certified United States mail to either party at its business address shown hereinabove shall be sufficient notice whenever required for any purpose in this Agreement.

35. *Effective Date.* This contract shall become effective and the City or its designated agents and citizens shall begin delivery of the solid waste to the Contractor_____days after the date of execution hereof.

City: _____
_____
_____

Contractor: _____
_____
_____

IN WITNESS WHEREOF, the City and Contractor have executed this Agreement as of the day and year first above written.

Approved as to Form _____
City Attorney

City of _____
A municipal corporation of the State of _____

By _____
By _____
By _____

(Name of Contractor)

By _____
By _____

(Sealed, witnessed, and/or notarized as required by the laws of applicable State.)

FEE SCHEDULE

(Alternate methods of charge)

1. $_____ per ton of solid waste
2. $_____ per yard of compacted solid waste
3. $_____ per yard of uncompacted solid waste
4. $_____ minimum fee per load
5. $_____ per ton of solid waste consisting solely of material such as bricks, concrete, dirt, etc.

6. The City shall pay to the contractor a minimum fee of $_____ for each year or yearly extension of this agreement.

Toxic, volatile, or other hazardous materials requiring special handling shall be clearly marked by the City and, upon payment of mutually agreed upon fees, shall be disposed of by the Contractor pursuant to the terms of Item 2 of the contract.

The Contractor shall submit billings to the City at the close of business at the end of each month for all other waste placed in the sanitary landfill and the City shall pay the Contractor on or before the tenth day of the following month; payments shall be mailed to the Contractor at the address shown above.